ratus and galvanometers—by the men engaged in commercial testing because of the description of the methods suited to the needs and the good advice given in regard to the selection of apparatus for different kinds of work; by the instructor in our educational institutions because it constitutes a valuable reference book for him and his students; by the specialist because to him the author succeeds in a marked degree in giving the benefit of his wide experience in the design, construction, and use of resistance and electrical measuring apparatus.

Frank Wenner
Bureau of Standards

Metabolic Water: Its Production and Rôle in Vital Phenomena. By S. M. Babcock. Research Bulletin No. 22, The University of Wisconsin Agricultural Experiment Station, March, 1912.

The purpose of the author in this paper of 181 pages is to show that metabolic water is not only produced in considerable quantity from the organic constituents of the foods and tissues of plants and animals by oxidation and hydration, but also that water from such sources exercises a different function from imbibed water, and that in very many cases is essential to the growth and continued life of the organism in question. The studies were conducted with corn plants for the most part. The studies from the zoological standpoint were not so extensive. The animals used were clothes moth (*Tinea pellionella*); bee moth (*Galleria mellonella*); pea weevil (*Bruchus quadri-maculatus*); flour beetle (*Tribolium confusum* and *Ephestia kuehniella*).

The scope of the study is indicated by the following selected headings taken from the table of contents: Sources of metabolic water (respiration, etc.); metabolic water in seeds; germination phenomena; metabolic water in mature plants; composition of plant tissues; development of hydrolytic ferments in seeds; imbibition; reserve nutrients in plants; water content of green and ripe fruits; intramolecular respiration; water produced in animal metabolism; water requirements of animals. The author seems to have shown in a rather convincing manner that metabolic water plays an immensely important rôle in the life of both plants and animals. The paper contains many facts collected together in a form such that they should be interesting to every plant physiologist.

Raymond J. Pool
The University of Nebraska

Fresh Air and How to Use It. By Thomas Spees Carrington, M.D. The National Association for the Study and Prevention of Tuberculosis. 1912.

This little book is timely and well conceived. It finds an enormous audience prepared to welcome it through sanitary precepts from press and platform for many years. Therefore the responsibility of the author is somewhat unique. One could wish that the execution of the work might deserve unqualified praise. Fortunately it should be easy for the author to correct such matters as call for adverse criticism.

We believe that it is better to be true than to be convincing. Our author's introduction needs rewriting, for it is founded on the old conception that the prime danger from "bad air" lies in its chemical composition. His effort to put a known good thing on a scientific basis suggests the abominable method of instruction by which many popular school physiologies have been perverted for the purpose of lambasting narcotic drugs and alcohol.

In spite of a vast amount of research we are still none too well informed as to the essential physiological relations of "pure" air.

But it seems to have been demonstrated that all *morbid sensations* attributable to "foul air" depend wholly upon the effects of combined humidity and heat upon the skin. *Moving* air—a breeze—accelerates heat loss from the body, stimulates the skin in other ways and brings subjective comfort. Now in nature moving air is found most easily in the open or at least in apartments exposed to the open. Sanitary architects—God save the mark—find their task in evolving intricacies of construction whose design it is to obviate

the sanitary evils of construction. We have known of school rooms heated by the "indirect method" in which the winter air containing but a few grains of moisture to the cubic foot is warmed by passing over steam coils and then delivered to the school room, whose windows are closed by edict, its relative humidity so lowered that the moisture must be actually sucked from the skins and mucous membranes of the defenceless children. This air is chemically pure but physiologically like salt to a raw surface.

The little book under consideration is excellent in the orderly presentation of the various phases of the subject and too much praise can not be given for its profuseness of illustration, one hundred and fifty cuts being devoted to this purpose. The average mind derives a clearer idea of architectural design from a simple figure than from pages of labored description. It is to be hoped that in preparing another edition the author will carefully review his text with the purpose of removing all obscurity. Thus, the legend to Fig. 1, p. 22, reads "When the upper window sash is let down and the shade lowered, a larger amount of fresh air may be obtained by inserting a strip of open mesh netting between the shade and the roller." This is perfectly clear when the mechanism is understood, but it requires an undue mental effort to grasp its meaning. The author was happy in his section devoted to the use of clothing and he might profitably have discussed somewhat more in detail the physiological relations of textures—as, for example, the relative properties of silk, linen-mesh and woolen underwear. One of the most valuable chapters of the book is that which exploits the advantages of the house roof to the seeker after fresh air. It is worth enquiring whether it would not be well to devise a mirror situated so as to reflect the scenes of the street to relieve the monotony of "sitting out."

In the section devoted to the clothes-closet, it would have been well had the author insisted that garments, before being stored away, should be hung in the open air, in sunlight if possible, *with the pockets turned inside out.*

Few things are more difficult than to present a "nature study" which shall be scientifically true while forensically convincing to the lay mind. The practical essentials of fresh-air teaching have been excellently presented in this volume, but we are all too much interested in the subject to tolerate the smallest gnat in the ointment. Modern research suggests that the open air calls upon the autonomic systems of the body for somewhat the same kind of response that physical exercise demands of the skeletal nerves and muscles. We know definitely that in the treatment of tuberculosis, for example, exercise may be healing or deadly according to the state of the patient. The truth may very well be that a prescription of "fresh air" is not so simple, but must in scientific therapeutics be analyzed into its physical components of barometric pressure, motion, humidity, temperature, illumination and electric tension and to all these there must be added the one constant excipient—elixir of joy.

HENRY SEWALL

SCIENTIFIC JOURNALS AND ARTICLES

THE March number (volume 19, number 6) of the *Bulletin of the American Mathematical Society* contains the following papers: Report of the nineteenth annual meeting of the society, by F. N. Cole; "The product of two or more groups," by G. A. Miller; "The mathematics of Mahāvīrācārya," by D. E. Smith; "Shorter notices:" Townsend and Goodenough's First Course in Calculus and Essentials of Calculus, by N. J. Lennes; Dziobek's Differential- und Integral-Rechnung and Hack's Wahrscheinlichkeitsrechnung, by G. W. Myers; Brill's Relativitätsprinzip, Föppl's Technische Mechanik, Volume I., and Orlich's Theorie der Wechselströme, by E. B. Wilson; "Notes"; and "New Publications."

THE April number of the *Bulletin* contains: "Some general aspects of modern geometry," by E. J. Wilczyński; "On certain non-linear integral equations," by H. Galajikian; "A theorem on asymptotic series," by V. C. Poor; "On Poincaré's correction to Bruns' theo-